tyco / Healthcare

KENDALL

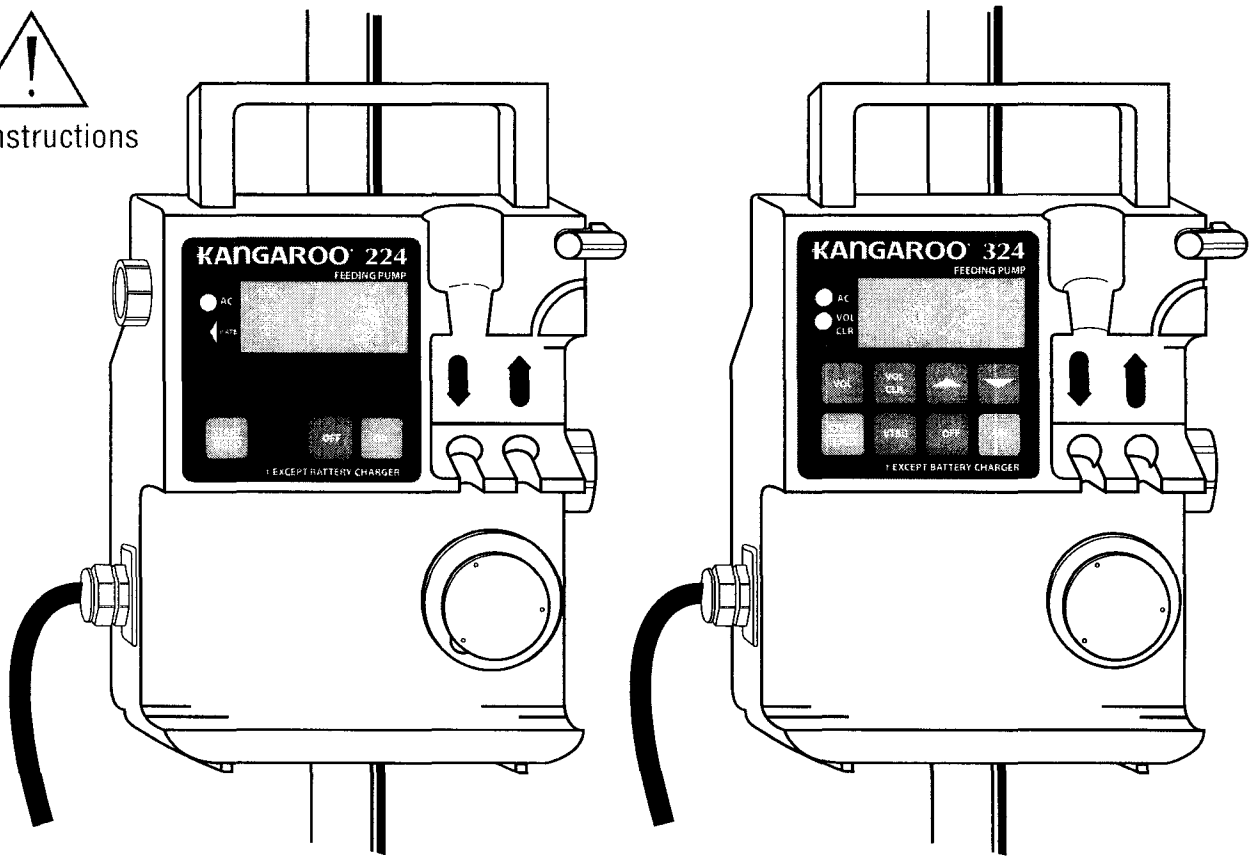
KANGAROO*

Enhanced 224/324 Feeding Pump

Service Manual

U.S.A. and Canada

See Instructions



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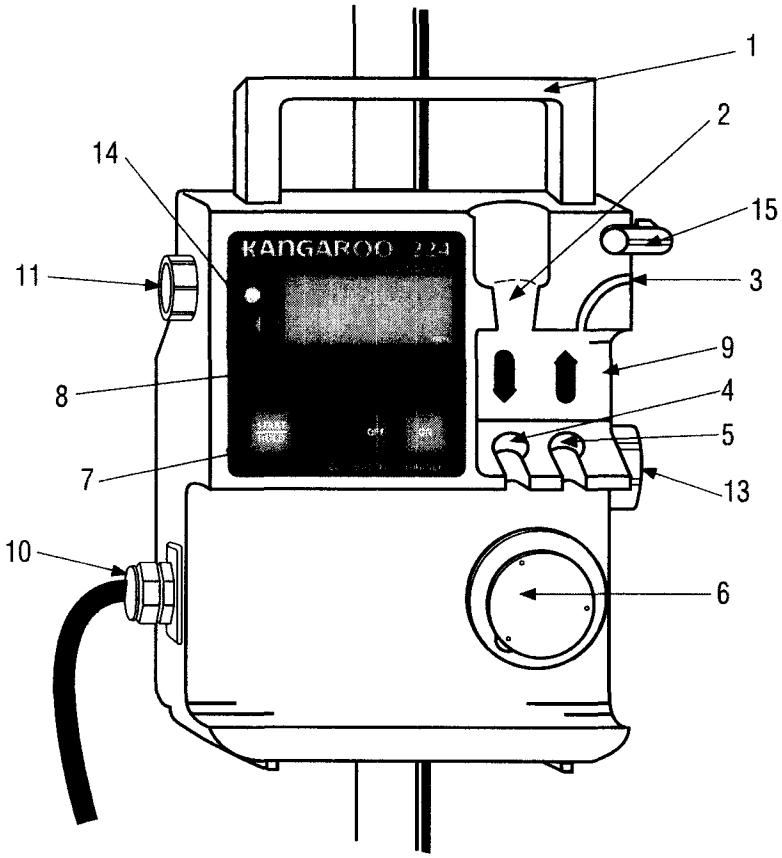
Product Description

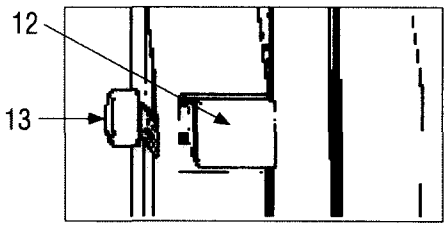
The Tyco Healthcare Kangaroo Feeding Pump is a rotary peristaltic pump designed to regulate the flow rate of enteral feedings. Among the features provided by this pump are:

- Portable operation - built in battery.
- Wide flow rate range of 5-300 ml/hr in 5 ml/hr increments.
- Small and lightweight for easy transport.
- Language Selection (11 Languages Available):
  English, French, German, Italian, Spanish, Swedish, Dutch, Portuguese, Finnish, Danish and Norwegian.
- Touch panel operation.
- Shut off and activation of audible and visible alarms when:
  - Feeding container is empty
  - Feeding tube becomes occluded
  - Drop sensors blocked
  - Battery low (alarms for approximately 15 minutes before pump shut off)
  - Unit is left on HOLD longer than 5 minutes
  - Pump set is improperly loaded
  - Self-diagnosed problem which requires technical servicing
  - Pump motor malfunction
- Adjustable alarm volume.
- Automatic systems check after pump has been turned ON.
- Large LED display.
- Low occlusion pressure. Pump will not overcome back pressure greater than approximately 12 psi (82.7 kPa).
- Integral pole clamp.
- Use of safety interlock pump sets to safeguard against the risk of overinfusion due to misloading pump set onto pump.
- Pump running indicator lights.
- DC motor with intermittent operation.
- Memory of flow rate, setting is retained for 16 or 24 hours after pump is shut off, depending on AC connection status.

WARNING: This KANGAROO Pump requires the use of a KANGAROO Pump Set. The pump will not operate if sets other than KANGAROO Pump Sets are loaded onto the pump.

1. Handle
2. Upper Drip Chamber Guide (including drop sensor)
3. Tubing Guide
4. Lower Drip Chamber Guide
5. Retainer Lock
6. Rotor Assembly
7. Touch Panel
8. LED Display and Pump Running Indicator Lights
9. Direction for Use Label
10. Power Cord
11. Rate Control Knob
12. Pole Clamp
13. Pole Clamp Knob
14. AC Light
15. Tubing Guide Latch





REFER TO KANGAROO 224 PUMP OPERATING MANUAL FOR OPERATING PROCEDURES.

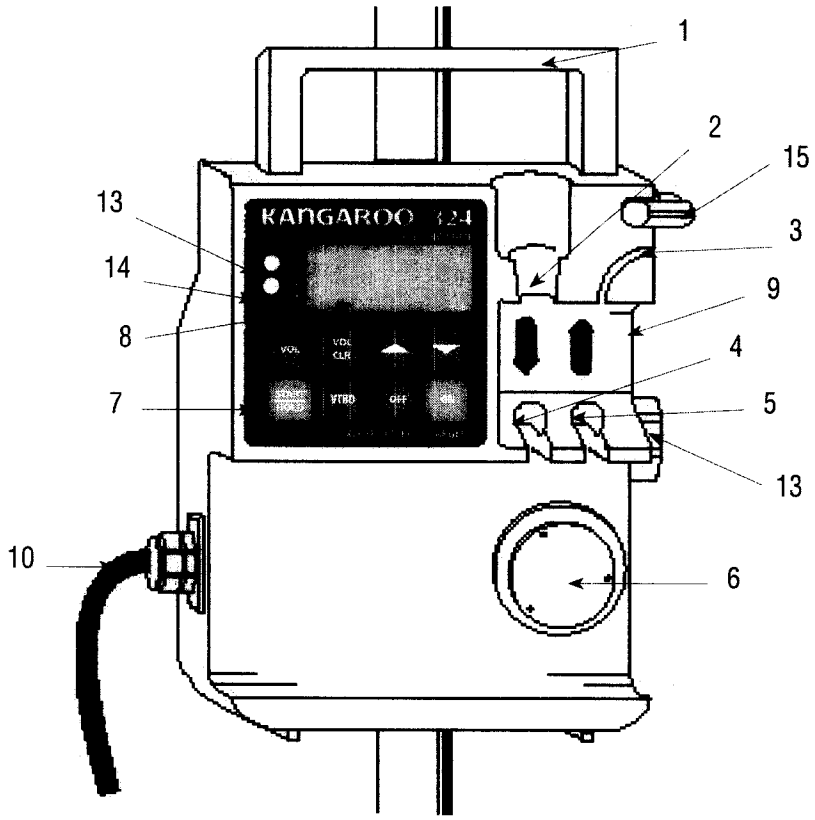
Product Description

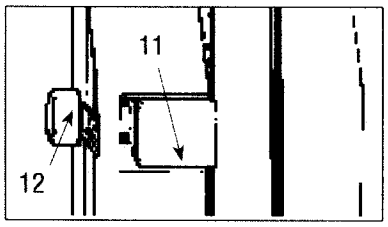
The Tyco Healthcare KANGAROO Feeding Pump is a rotary peristaltic pump designed to regulate the flow rate of enteral feedings. Among the features provided by this pump are:

- Portable operation - built in battery.
- Flow rates may be set in 1 ml/hr increments from 1 to 300 ml/hr.
- Small and lightweight for easy transport.
- Language Selection (11 Languages Available):
  English, French, German, Italian, Spanish, Swedish, Dutch, Portuguese, Finnish, Danish and Norwegian.
- Touch panel operation.
- Shut off and activation of audible and visible alarms when:
  - Feeding container is empty
  - Feeding tube becomes occluded
  - Drop sensors blocked
  - Battery low (alarms for apprximately 15 minutes before pump shut off)
  - Unit is left on HOLD longer than 5 minutes
  - Pump set is improperly loaded
  - Self-diagnosed problem which requires technical servicing
  - Preset dose has been delivered
  - Pump motor malfunction
- Automatic systems check after pump has been turned ON.
- Large LED display.
- Low occlusion pressure. Pump will not overcome back pressure greater than approximately 12 psi (82.7 kPa).
- Integral pole clamp.
- Use of safety interlock pump sets to safeguard against the risk of overinfusion due to misloading pump set onto pump.
- Pump running indicator lights.
- DC motor with intermittent operation.
- Programmable volume to be delivered.
- Adjustable alarm volume.
- Memory of flow rate, setting is retained for 16 or 24 hours after pump is shut off, depending on AC connection status.

WARNING: This KANGAROO Pump requires the use of a KANGAROO Pump Set. The pump will not operate if sets other than KANGAROO Pump Sets are loaded onto the pump.

1. Handle
2. Upper Drip Chamber Guide (including drop sensor)
3. Tubing Guide
4. Lower Drip Chamber Guide
5. Retainer Lock
6. Rotor Assembly
7. Touch Panel
8. LED Display and Pump Running Indicator Lights
9. Direction for Use Label
10. Power Cord
11. Pole Clamp
12. Pole Clamp Knob
13. AC Light
14. Vol CLR Light
15. Tubing Guide Latch





REFER TO KANGAROO 324 PUMP OPERATING MANUAL FOR OPERATING PROCEDURES.

Normal Operation

Under normal operating circumstances, the KANGAROO Enhanced 224/324 feeding pump will be plugged into a wall outlet. Pressing the ON key will cause the displays to light all segments and produce a short beep on the audio alarm. The pump will then display "VoL" and show the delivered volume (if any), "Vtbd" and the currently programmed VTBD. If VTBD is zero, it will not be shown. This is necessary since the K224 does not support the VTBD feature and the software is the same for both pumps. An administration set is primed and loaded into the unit. Once a set has been properly loaded and the unit turned on (by pressing the ON key), the pump will display the volume delivered and vtbd setting that is in memory (if any) and then the programmed rate (if any). Pressing the START/HOLD key initiates the feeding operation. For feeding rates of 1 to 10 ml/hr, the rotor will turn 1/3 revolution between pauses. For rates of 11 to 300 ml/hr, the rotor will turn a full revolution between pauses. The pump will continue to feed as long as normal flow and operating conditions persist or until a Volume to be Delivered has been reached. The pump can be halted at any time by pressing the START/HOLD key or the OFF key. Pump settings (rate and VTBD) can only be changed with the pump in the HOLD mode (display flashing). Pump settings are retained for a minimum of 16 hours after the unit is shut off unless a dead battery level is detected with no AC connection or an internal circuit error occurs.

Battery Operation

When the pump is operated on the internal, rechargeable Nickel Metal Hydride (NiMH) batteries, the operation is virtually the same as that of the normal operation as the described above. The only difference between the two modes is that the pump will alarm, LO BAT, when the battery voltage drops below 6.5 volts. The user has the option of plugging the unit into a wall outlet and continuing with normal operation (while the battery pack recharges), or continuing for an additional short period of time. Once the battery voltage reaches the dead battery level (~6.1 volts), the unit will again alarm LO BAT with the audio alarm, however, additional pumping is not available (only the OFF key is active) and the unit will shut off after 5 seconds.

To help conserve battery power, the displays are dimmed (half brightness) after 60 seconds of no keypad activity. Pressing any key will return the displays to full brightness.

The KANGAROO Enhanced 224/324 pump uses a 6-cell, Nickel Metal Hydride battery pack. This has a nominal voltage of about 7.2 volts. A fully charged battery may go as high as 8.3 volts. Low battery is defined as ~6.5 volts. The battery pack has a capacity of 1100mA*hrs, providing approximately 16 to 18 hours of pump use at 125 ml/hr from a fully charged battery.

Replacement battery packs are available from Tyco Healthcare Group LP (See Section Vi - Factory Service).

WARNING: Replace the battery pack only with the same type and rating of battery.

Key Operation

OFF:

Turns the pump off. Battery charging will continue even when the pump is off.

ON:

Turns the pump on. Enters BIOTECH MODE if held for more than 5 seconds when turning pump on.

Key Operation (Cont.)

VOL (324 Only):

displays volume for 5 seconds when pressed. If the pump has been off for 24 hours, the volume delivered is automatically reset to zero.

VOL CLR (324 Only):

Clears volume delivered when pressed after VoL has been pressed. the Vol CLR light will go on when volume delivered has been reset to zero. Volume delivered can be cleared until the preset dose has been delivered.

VTBD (324 Only):

Displays the volume to be delivered setting.

Up/Down Arrows (324 Only):

Used to increase/decrease the rate setting when the pump is in hold mode. Also used to increase/decrease the VTBD setting after pressing the VTBD key, when pump is in hold mode. Also used to increase/decrease alarm volume while the alarm is sounding. These keys are not active when the pump is running. The user is reminded of inactive keys by a chirp when the key is pressed.

By holding in the ▲/▼ arrow keys, the rate of change of the selected value will increase in three steps. Starting at zero, as an example, the setting will increase by ones from 0 to 5, by fives from 5 to 80 and by tens from 80 to 300ml/hr. The operation is similar for the VTBD setting up to 2000ml. The rate change speed is increased while incrementing by fives and increased again while incrementing by tens.

Start/Hold:

Pressing the Start/Hold key while the pump is in hold mode will cause the unit to start pumping, provided there is a set loaded and a rate setting other than zero. Pressing the Start/Hold key while the pump is running will halt the motor and place the unit in the hold mode. The Start/Hold key is also used to clear alarms. The first press will silence the audible alarm and the second press will clear the alarm and return the pump to hold mode.

Rate Knob (224 Only):

The rate knob is located on the left side of the pump. Its function is similar to the arrow keys. Turning the knob counter-clockwise increases the selected setting while turning it counter-clockwise decreases the selected setting. Rate knob increments/decrements are fixed at 5.

AC Status LED:

This light will be ON when the pump is connected to an AC outlet. The AC status LED functions even when the pump is turned off. The light is OFF when the pump is on battery power.

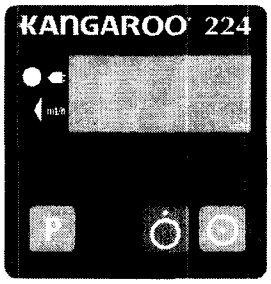
VOL CLR LED (324 Only):

The volume clear LED is on when the volume delivered is 0. After delivery of at least 1ml of fluid, the light will turn off.

Fail Safe:

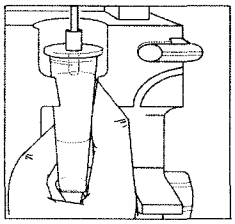
The pump contains a hardware fail safe circuit that will disable the pump in the event of a motor runaway. If the motor is powered for more than 7 to 9 seconds, an internal SCR will fire and blow the system fuse. This completely shuts the pump off and requires factory repair before the unit can be returned to normal operation.

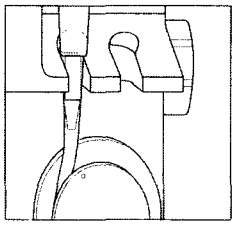
Beginning Administration



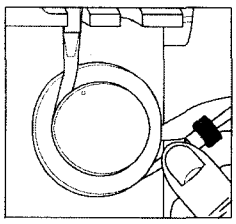
Below are general instructions for inserting all Tyco Healthcare Group LP Pump sets into the KANGAROO* 224 Feeding Pump.

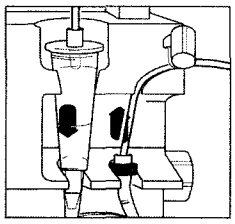
1. Press **ON**.
2. Wait while pump performs system check. (Displays "8888" for a moment.)
3. When flow rate is displayed, set desired rate in ml/hr by turning rate control knob on side of pump.





4. Slide drip chamber into lower drip chamber guide.
5. Seat and secure chamber into upper drip chamber guide (A).
6. Remove distal connector protective cover.
7. Slowly open clamp and fill entire line with fluid, leaving a few drops of fluid in the drip chamber. NOTE: AVOID FILLING THE DRIP CHAMBER MORE THAN HALF FULL. Close clamp.
8. Attach distal connector to feeding tube.





9. Grasp silicone tubing and gently stretch around rollers. Insert retainer into retainer lock (B). Thread tubing over tubing guide (C). Secure latch over tubing(D).

VERIFY THAT THE PUMP SET IS PROPERLY LOADED IN THE PUMP BEFORE PROCEEDING. AN IMPROPERLY LOADED PUMP SET COULD RESULT IN UNCONTROLLED FLOW AND POSSIBLE PATIENT INJURY.

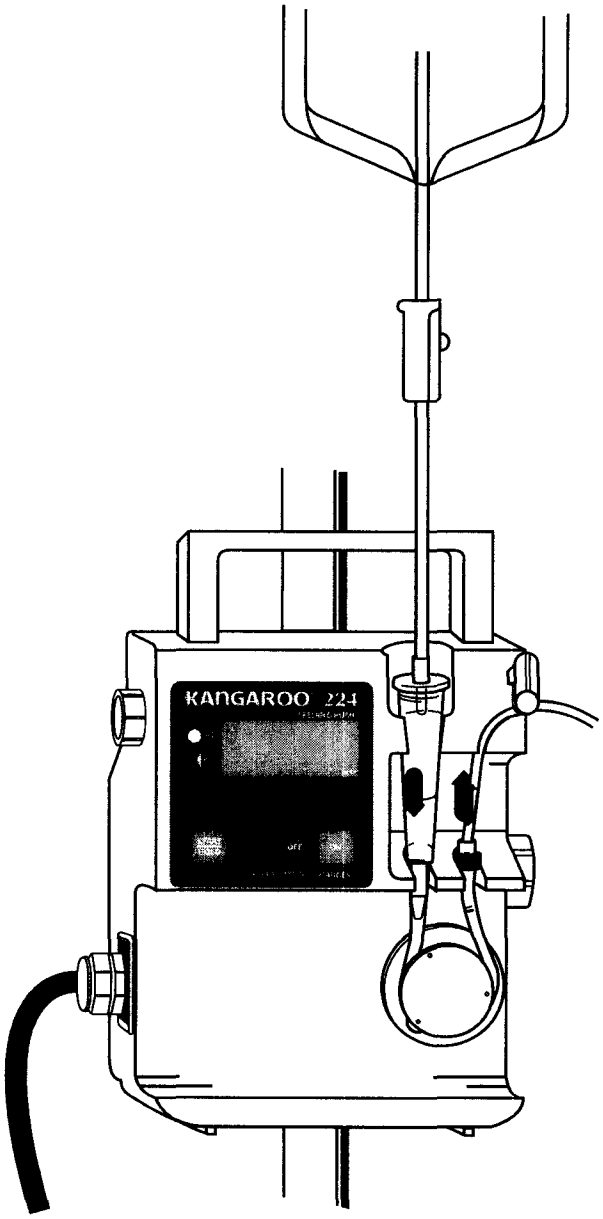
10. Open control clamp.
11. Press **START/HOLD**.
12 Proceed with feeding.
13. Disposal of pump set. Pump set accuracy cannot be guaranteed beyond 24 hours of use.

Used pump sets shall be handled as follows:

To prevent employee exposure risk, the materials must be handled in accordance with bloodborne pathogen standards before being placed in an approved disposal container.

Disposal must be performed in accordance with current medical practices or local regulations in regards to disposal of infectious, biological or medical waste.

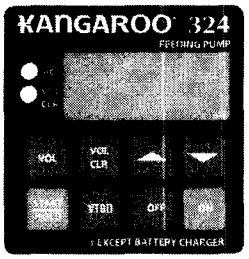
Example of proper placement of Pump Set in KANGAROO* 224 Feeding Pump.



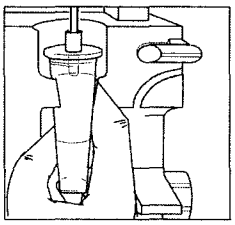
Note: When in use with IV pole, assure feeding bag hangs a maximum vertical extension above pump.

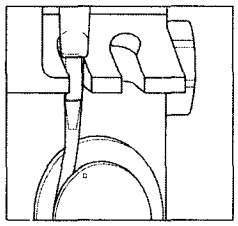
Beginning Administration

Below are general instructions for inserting all Tyco Healthcare Group LP Pump sets into the KANGAROO* 324 Feeding Pump.

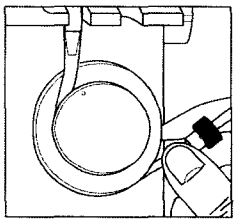


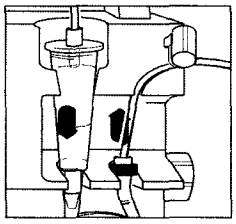
1. Press **ON**.
2. Wait while pump performs system check. (Displays "8888" for a moment.)
3. Check **VOL CLR** light or press **VOL** to insure that volume delivered is clear, if desired.
4. Rate delivery may be changed when the delivery rate is shown on the display by pressing ▲ or ▼ button. Holding button in will cause numbers to continue to increase or decrease.





5. Slide drip chamber into upper drip chamber guide
6. Seat and secure chamber into lower drip chamber guide (A).
7. Remove distal connector protective cover.
8. Slowly open clamp and fill entire line with fluid, leaving a few drops of fluid in the drip chamber. NOTE: AVOID FILLING THE DRIP CHAMBER MORE THAN HALF FULL. Close clamp.
9. Attach distal connector to feeding tube.
10. Grasp silicone tubing and gently stretch around rollers. Insert retainer into retainer lock (B). Thread tubing over tubing guide (C). Secure latch over tubing(D).





VERIFY THAT THE PUMP SET IS PROPERLY LOADED IN THE PUMP BEFORE PROCEEDING. AN IMPROPERLY LOADED PUMP SET COULD RESULT IN UNCONTROLLED FLOW AND POSSIBLE PATIENT INJURY.

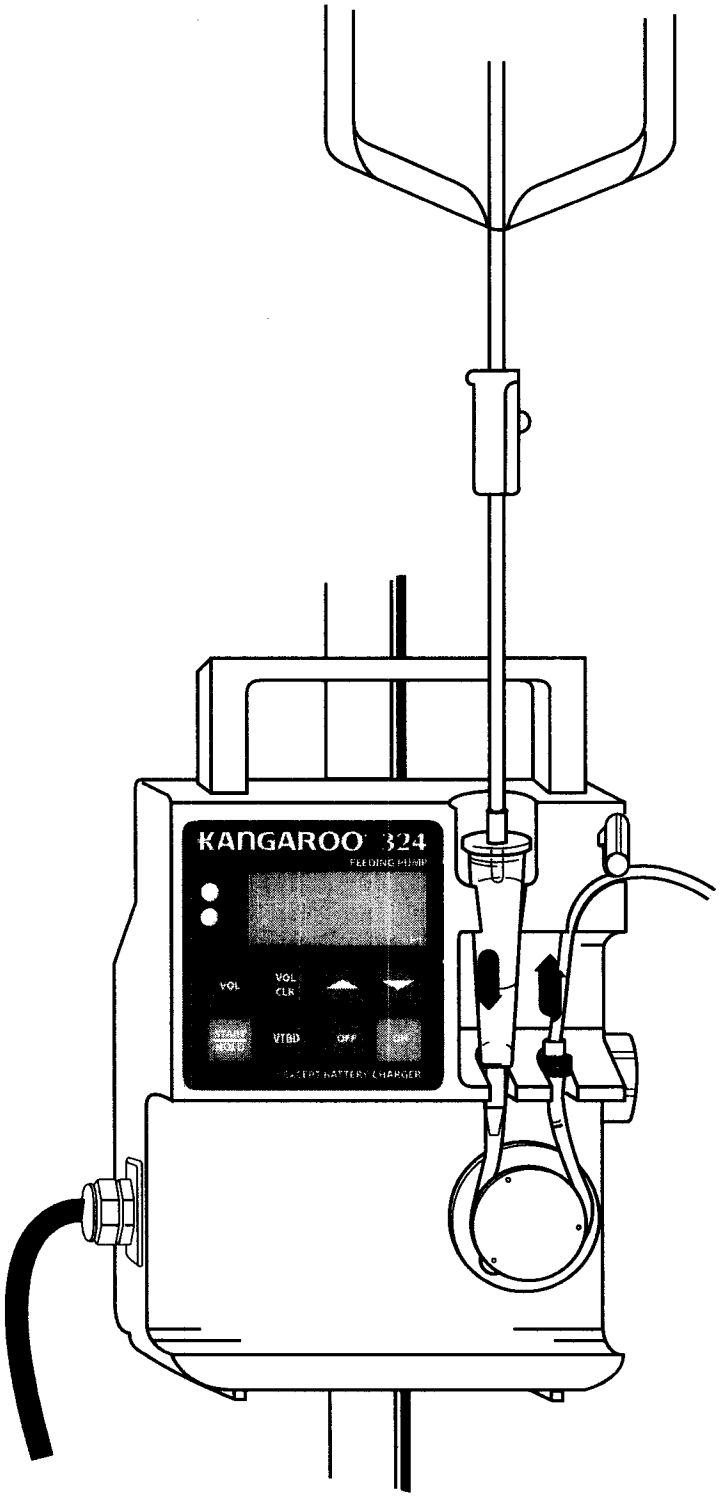
11. Set **VTBD**, if desired, press **VTBD**, then press ▲ or ▼ to set **VTBD** desired.
12. Open control clamp.
13 Press **START/HOLD**.
14. Proceed with feeding.
15. Disposal of pump set.

Used pump sets shall be handled as follows:

To prevent employee exposure risk, the materials must be handled in accordance with bloodborne pathogen standards before being placed in an approved disposal container.

Disposal must be performed in accordance with current medical practices or local regulations in regards to disposal of infectious, biological or medical waste.

Example of proper placement of Pump Set in KANGAROO* 324 Feeding Pump.



Note: When in use with IV pole, assure feeding bag hangs a maximum vertical extension above pump.

KENDALL

KANGAROO* 224 ENHANCED RECOMMENDED PERFORMANCE TEST

Serial Number: _____ Date: _____

Equipment Control Number: _____ Technician: _____

CAUTION:

DISCONNECT PUMP FROM AC POWER SOURCE BEFORE CLEANING.
DO NOT IMMERSE PUMP OR POWER CORD IN WATER OR OTHER CLEANING SOLUTIONS.
CLEAN USING A DAMP (NOT WET) CLOTH OR SPONGE ONLY. DO NOT CONNECT TO AC POWER SOURCE UNTIL PUMP AND POWER CORD ARE THOROUGHLY DRY.

AS WITH ANY AC POWERED ELECTRICAL DEVICE, CARE MUST BE TAKEN TO PREVENT LIQUID FROM ENTERING THE PUMP. FAILURE TO FOLLOW THE CLEANING PROCEDURES HEREIN COULD RESULT IN ELECTRICAL SHOCK, FIRE HAZARD OR DAMAGE TO ELECTRICAL COMPONENTS.

DO NOT USE STRONG CLEANERS SUCH AS SPRAY-NINE**, PHISOHEX†, HIBICLENS††, OR VESTA-SYDE†* BECAUSE DAMAGE TO THE PUMP CASE HOUSING CAN RESULT.

NOTES:

REFER TO FIGURE 1: FOR VISUAL DESCRIPTION OF PRODUCT.
REFER TO FIGURE 2: FOR EXAMPLE OF PROPERLY LOADED FEEDING SET.
IT IS RECOMMENDED THIS TEST BE COMPLETED NO LESS THAN ONCE A YEAR.

1. Exterior Cleaning/Inspection:
   a. Power cord not damaged (inspect the entire length of cord) _____
   b. Rotor rollers turn freely _____
   c. Clean case, rotor, and drop sensor window _____
      (refer to Section VI "Cleaning")
   d. Check rotor shaft for straightness _____

2. Touch Panel and Display Functional Check:
   (Verify the correct function of the following features according to Section II of the K224 Operating Manual)
   a. "ON" button _____
   b. "OFF" button _____
   c. "START/HOLD" button _____
   d. AC Light _____
   e. RATE Contol Knob/Display (5-300 in increments of 5) _____

3. Visual Indicators and Audible Alarms:
   (Verify correct message displays and alarm sounds by generating the applicable alarm condition according to Section III of the KANGAROO 224 Pump Operating Manual.)
   a. Load Set "LoAd SEt" _____
   b. Flow Error "FLO Err" _____
   c. Hold Error "HLd Err" _____
   d. Volume Adjust _____
      (Verify correct function by turning rate knob while alarm sounds)

4. Motor Speed (with feeding set in place):
   a. Fill a feeding set with water and load it onto the pump.
   b. Turn the pump on, prime the set, and set the delivery rate to 295 ml/hr.
   c. Using a handheld stopwatch, measure the time from motor start to motor start. Perform 5 times and average the numbers (this will tend to cancel out any human error).

      _____ _____ _____ _____ _____

   d. The average measured time interval must be between 4.19 and 4.45 seconds.

      _____ sec.

5. Operational Tests:
   a. Fill a feeding set with water and load it onto the pump.
   b. Turn the pump on and prime the set.
   c. Set the delivery rate to 150 ml/hr.
   d. Press the START/HOLD button and run the pump for a period of five minutes and check for any functional failures.

      PASS FAIL

      _____ _____

CAUTION:
THE MANUFACTURER RECOMMENDS AN ELECTRICAL SAFETY TEST BE PERFORMED ON THE UNIT IF THE PUMP HAS BEEN OPENED, SERVICED INTERNALLY AND/OR FLUID INGRESS IS SUSPECTED IN THE PUMP. PLEASE CONTACT THE MANUFACTURER OR APPROVED SERVICE CENTER TO HAVE THIS TEST PERFORMED PER APPLICABLE STANDARDS.

COMMENTS:

_____

_____

_____

_____

_____

Figure 1.

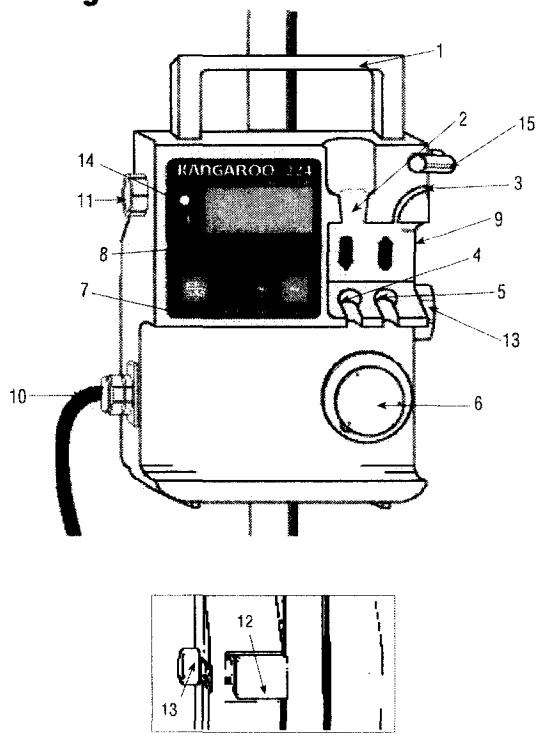
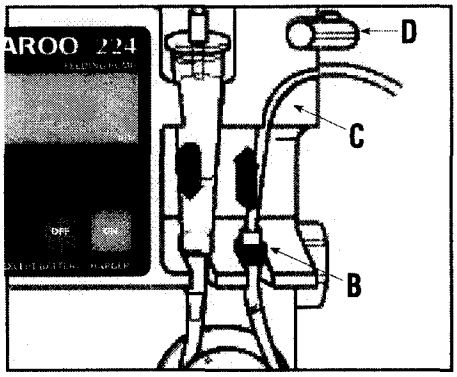


Figure 2.



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3. Tubing Guide
4. Lower Drip Chamber Guide
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9. Directions for Use Label
10. Power Cord
11. Rate Control Knob
12. Pole Clamp
13. Pole Clamp Knob
14. AC Light
15. Tubing Guide Latch

KENDALL

KANGAROO* 324 ENHANCED RECOMMENDED PERFORMANCE TEST

Serial Number: _____ Date: _____

Equipment Control Number: _____ Technician: _____

CAUTION:

DISCONNECT PUMP FROM AC POWER SOURCE BEFORE CLEANING.
DO NOT IMMERSE PUMP OR POWER CORD IN WATER OR OTHER CLEANING SOLUTIONS.
CLEAN USING A DAMP (NOT WET) CLOTH OR SPONGE ONLY. DO NOT CONNECT TO AC POWER SOURCE UNTIL PUMP AND POWER CORD ARE THOROUGHLY DRY.

AS WITH ANY AC POWERED ELECTRICAL DEVICE, CARE MUST BE TAKEN TO PREVENT LIQUID FROM ENTERING THE PUMP. FAILURE TO FOLLOW THE CLEANING PROCEDURES HEREIN COULD RESULT IN ELECTRICAL SHOCK, FIRE HAZARD OR DAMAGE TO ELECTRICAL COMPONENTS.

DO NOT USE STRONG CLEANERS SUCH AS SPRAY-NINE**, PHISOHEX†, HIBICLENS††, OR VESTA-SYDE†* BECAUSE DAMAGE TO THE PUMP CASE HOUSING CAN RESULT.

NOTES:

REFER TO FIGURE 1: FOR VISUAL DESCRIPTION OF PRODUCT.
REFER TO FIGURE 2: FOR EXAMPLE OF PROPERLY LOADED FEEDING SET.
IT IS RECOMMENDED THIS TEST BE COMPLETED NO LESS THAN ONCE A YEAR.

1. Exterior Cleaning/Inspection:
   a. Power cord not damaged (inspect the entire length of cord) _____
   b. Rotor rollers turn freely _____
   c. Clean case, rotor, and drop sensor window _____
      (refer to Section IV "Cleaning')
   d. Check rotor shaft for straightness _____

2. Touch Panel and Display Functional Check:
   (Verify correct function of the following features according to Section II of the K324 Operating Manual.)
   a. "ON" button _____
   b. "OFF" button _____
   c. "START/HOLD" button _____
   d. "VOL" button _____
   e. "VTBD" button _____
   f. "VOL CLR" button _____
   g. "INCREMENT" button (1-300) _____
   h. "DECREMENT" button (300-1) _____
   i. AC Light _____
   j. VOL CLR Light _____

3. Visual Indicators and Audible Alarms:
   (Verify correct message displays and alarm sounds by generating the applicable alarm condition according to Section III of the KANGAROO 324 Pump Operating Manual.)
   a. Load Set "LoAd SEt" _____
   b. Flow Error "FLo Err" _____
   c. Hold Error "HLd Err" _____
   d. VTBD Delivered "Vtbd dEL" _____
   e. Volume Adjust
      (Verify correct function of this feature by pressing the "Increment" and "Decrement" buttons while the alarm sounds.) _____

4. Motor Speed (with feeding set in place):
   a. Fill a feeding set with water and load it onto the pump.
   b. Turn the pump on, prime the set, and set the delivery rate to 295 ml/hr.
   c. Using a handheld stopwatch, measure the time from motor start to motor start. Perform 5 times and average the numbers (this will tend to cancel out any human error).

      _____ _____ _____ _____ _____

   d. The average measured time interval must be between 4.19 and 4.45 seconds.

      _____ sec.

4. Operational Tests:
   a. Fill a feeding set with water and load it onto the pump.
   b. Turn the pump on and prime the set.
   c. Set the delivery rate to 150 ml/hr.
   d. Press the START/HOLD button and run the pump for a period of five minutes and check for any functional failures.

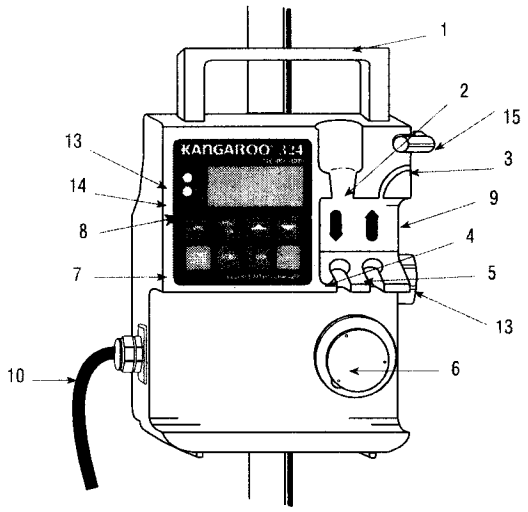
      PASS FAIL
      ____ ____

CAUTION:
THE MANUFACTURER RECOMMENDS AN ELECTRICAL SAFETY TEST BE PERFORMED ON THE UNIT IF THE PUMP HAS BEEN OPENED, SERVICED INTERNALLY AND/OR FLUID INGRESS IS SUSPECTED IN THE PUMP. PLEASE CONTACT THE MANUFACTURER OR APPROVED SERVICE CENTER TO HAVE THIS TEST PERFORMED PER APPLICABLE STANDARDS.

COMMENTS:

_____
_____
_____
_____
_____

Figure 1.



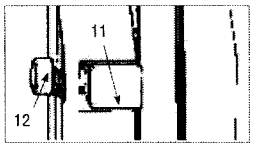
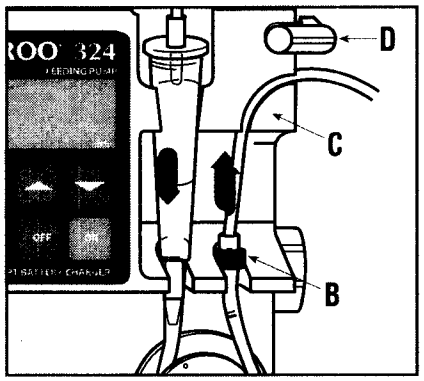


Figure 2.



1. Handle
2. Upper Drip Chamber Guide (including drop sensor)
3. Tubing Guide
4. Lower Drip Chamber Guide
5. Retainer Lock
6. Rotor Assembly
7. Touch Panel
8. LED Display and Pump Running Indicator Lights
9. Directions for Use Label
10. Power Cord
11. Pole Clamp
12. Pole Clamp Knob
13. AC Light
14. Vol CLR Light
15. Tubing Guide Latch

SECTION IV Alarms

The KANGAROO* Enhanced 224/324 Feeding Pump has been designed to provide audible and visible alarms under several conditions where proper performance cannot be maintained. The visible alarm is in the form of a message shown on the display.

Hold Error: (HLd Err)

This error occurs if the pump is turned ON for more than 5 minutes with no activity on the keys. Displays HOLD ERR and sounds the low-priority audio alarm. Press Start/Hold twice clears the alarm. Normal operation can resume by pressing the Start/Hold key again.

VTBD DELIVERED: (Vtbd dEL)

When the delivered bolus reaches the programmed VTBD, the pump stops pumping and displays VTBD DEL and the low priority audio alarm is sounded. The bolus can be repeated by pressing the Start/Hold key twice to clear the alarm, and then pressing the key again to initiate the next bolus feeding.

Flow Error: (Flo Err)

A flow error occurs when there are an insufficient number of drops detected in the chamber to support the current flow rate. Pumping stops and the pump alarms. Displays Flo Err and sounds the audio alarm. Pressing Start/Hold twice clears the alarm. Normal operation can resume by pressing the Start/Hold key again, provided the occlusion has been cleared.

The following conditions will cause a flow error:

Rate 1 to 10: 3 continuous cycles (1/3 revolution) with less than 2 drops per cycle.

Rate 11 to 300: 4 continuous cycles (Full revolution) with less than 4 drops per cycle.

Load Set Error: (LoAd SEt)

If the administration set becomes dislodged anytime after loading, the pump will stop pumping and signal the load set alarm. Displays LOAD SET and sounds the audio alarm. This alarm can be cleared by properly loading a set or by pressing the Start/Hold key twice. If the alarm is cleared by pressing the Start/Hold key, the LOAD SET alarm will regenerate with the audio alarm after 20 seconds.

System Error: (SYS Err)

A system error is caused by a number of things, which will prevent the pump from operating properly. In general, they are things that might be user correctable such as a jammed rotor that requires cleaning. The pump displays SYS ERR and sounds the audio alarm. Pressing the Start/Hold key twice clears the error and returns the pump to hold mode. Normal operation can resume by pressing the Start/Hold key again, provided the error condition has been corrected.

Internal Circuit Error:

An internal circuit error is a major failure that is not user correctable and requires the unit to be returned to the factory for service. Displays "**8888**" and sounds the audio alarm. Only the OFF key is active. The pump shuts itself off after 5 seconds and enters a completely dead state.

Low/Dead Battery: (Lo bAt)

The pump continuously monitors the battery voltage, even during charging. When the battery voltage drops to about 6.5 volts, pumping stops and the LOW BAT alarm is displayed along with the audio alarm. The user has the option of clearing the alarm (by pressing Start/Hold twice) and continuing for a short time or plugging the unit into an AC outlet and allowing the battery to charge. Connection to AC will clear the alarm.

Dead battery is reached at about 6.1 volts and further pumping operation is disabled. The unit must be plugged into an AC outlet to continue normal operation.

The errors reported by the software are shown below, ranked from highest to lowest.

Internal circuit error

Dead battery

System error

Low battery

Load set

Flow error

VTBD delivered

Hold error

Alarming and clearing of error conditions is done from the highest to the lowest priority. For example, a system error must be cleared before a flow error can be cleared. Likewise, a system error alarm would override a flow error alarm. Upon clearing the system error alarm, the flow error alarm would be generated.

SECTION IV Alarms

ERROR/ALARM/INFORMATIONAL MESSAGES:

English (0)	French (1)	German (2)	Spanish (3)	Italian (4)	Dutch (5)	Swedish (6)	Danish (7)	Finnish (8)	Norwegian (9)	Portuguese (10)
SYS Err	Err SYS	ALArSYS	Err SiS	SYS Err	SYSFout	SYSt FEL	SYSFEJL	SYS VirH	SYSt FEiL	Err SiS
LoAd SEt	no tubE	no SEt	no SEt	no SEt	gEEnSEt	FEL SEt	FEJL SEt	PAnESEt	FEiL SEt	no SEt
HLd Err	Err P	ALArHALt	Err PAuS	FinEPAuS	StrtPonP	PAuS FEL	PAuSFEJL	PAuS Err	PAuS FEiL	PAuS
Lo bAt	bAtdECH	bAt LEEr	bAt bAJA	bAttSCAr	bAttLEEg	SVAg bAtt	SVAg bAtt	Virt VAH	SVAg bAtt	bAt FrAC
Vtbd dEL	Vtbd dEL	Vtbd gEL	Fin VoL	FinE Vtbd	Vtbd gEL	doS LEV	doS LEV	Vtbd VoL	doS LEV	VoL End
Vtbd	Vtbd	Vtbd	VoL A-Ad	Vtbd	Vtbd	doS	doS	Vtbd	doS	VoL Ad
FLo Err	Err dot	ALArnAHr	Err FLuJ	Err FEEd	gEEnVoEd	FLod FEL	FLodFEJL	FLo Err	FLYt FEiL	FLo Err

Each message is displayed as alternating 4 character words: example < LoAd> <SEt_>

Capitalization represents the actual displayed character.

Section V Circuit Description

Power ON Circuit

Two conditions exist in which the microcontroller will become active from a dead state:

1) AC connection
2) an ON key press.

With the microcontroller in a dead state, the 5 volt enable line has +Vbat voltage applied through R47. Pressing the ON key will draw the 5 volt enable line low through D6, which turns on VR2. VR2 supplies 5 volts to VR3, which supplies 3.3 volts to the microcontroller causing it to wake from a dead state. The microcontroller then turns on the power control and holds the collector of Q5 low, through R78. Then the microcontroller turns on the display through Q10, Q11, Q12, and Q13.

Power Control and Regulation

The power control and regulation section of the circuit has several functions:

1) Conversion of battery or +12VDC voltage to a regulated +5 volts
2) Conversion of +5 volts to 3.3 volts
3) Complete shutdown of the unit
4) Wake from a dead state when the ON key is pressed or AC is connected

Line Power

Line power is applied to the board through the JP1 connector using a 120V AC input. The board is then protected by two 125mA fuses at locations F1 and f2. Two jumpers are installed at locations J1 and J3 to provide power to the transformer.

AC to DC Conversion:

The secondary output of the transformer is connected to a varistor, MOV1, and a full wave bridge rectifier, D2. The 56 volt varistor clamps any extreme power surges and prevents subsequent circuitry from damage. The output of D2 is filtered by C12 and C13, resulting in a nominal +27VDC. The output of D2 can be monitored at TP1 pin 36. The ground reference for all DC measurements is TP1 pin 8.

+12VDC Supply Voltage Regulator:

The +27VDC output of D2 is supplied to U2. U2 is a switching regulator, which converts the +27VDC input to a +12VDC output. The +12VDC output is additionally filtered by C14. The +12VDC output is used to charge the battery through VR1 and provide pump power through D1 when AC is connected. The output of U2 can be monitored at TP1 pin 5.

Battery Charging Circuit:

Battery charging is accomplished by an adjustable current source, VR1. VR1 maintains a constant voltage across R16, producing a 140mA charging current when enabled. The current source output is filtered by C3 and protected by D4. The output of VR1 can be monitored at TP1 pin 30.

Battery Charging Contol Circuit:

Charge control is maintained by the charge enable signal of the microcontroller. When AC power is connected, the gate of Q8 is pulled to a logic high by R17. Charging is enabled by turning on Q2, which pulls the gate of Q8 low, turning on the MOSFET and supplying VR1. The charge control signal can be monitored at TP1 pin 7.

AC Status:

The status of the AC connection and +12VDC supply is monitored by the microcontroller. The open collector output of Q15 is pulled high by R37. When connected to AC power, the +12VDC supply is routed to Q15 through R54 and the output of Q15 is pulled low. The AC status signal can be monitored at TP1 pin 27.

+5VDC Voltage

The conversion of battery or +12 volts to a regulated +5 volts is accomplished by the regulator, VR2, and the pass transistor Q5 and/or Q6. The +5VDC can be monitored at TP17.

+3.3VDC Voltage

The voltage regulator VR3 accomplishes the conversion of +5VDC to a regulated +3.3VDC. The +3.3VDC can be monitored at TP18.

Microcontroller and Support

The microcontroller is a Texas Instruments MSP430F135. It has the capability of being programmed up to 100 times.

REPROGAMMING THE MICROPROCESSOR IS PERFORMED AT FACTORY SERVICE CENTERS ONLY. PUMPS REQUIRING THIS PROCEDURE MUST BE RETURNED TO THE FACTORY SERVICE CENTER.

Reset control is managed by U3 and R62, a microprocessor supervisory IC.

An 8MHz crystal, X1, produces the main time base for the micro-controller.

Battery Monitoring

The battery monitoring circuit consists of a voltage divider, R56 & R59, along with a filter capacitor C18. In order to provide the required accuracy, 1% resistors are used in this section of the circuitry.

The low and dead battery levels fall within a range of applicable voltages.
Low battery, high limit: 2.01Vdc (Vbatt = 6.62Vdc)
Low battery, low limit: 1.77Vdc (Vbatt = 6.38Vdc)
Dead battery, high limit: 1.89Vdc (Vbatt = 6.22Vdc)
Dead battery, low limit: 1.65Vdc (Vbatt = 5.98Vdc)

Display and Support

The AC indicator is used to communicate connection status to the user. The AC indicator is driven by the AC signal from the microcontroller.

The AC indicator has two states:
1) AC indicator is ON when pump is connected to AC power.
2) AC indicator is OFF when pump is not connected to AC power.

The VOL CLR indicator (K324 units only) is ON only when the pump has not delivered any volume and/or the volume has been cleared.

Display:

The microcontroller is used to turn on and off the 7 segment displays. Displays dim after 60 seconds of inactivity on the keypad and then return to full brightness upon any key activation (except the ON key), the rate knob or alarm occurrence.

Power is supplied to the display through Q10 - Q13, using R50-R53 as current limiting resistors.
R40 - R43 are used to pull the microcontroller legs high when a display segment is not in use.

Drop Detection

The Enhanced Pump uses an infrared emitter and detector to sense drops in the drip chamber as the fluid moves through the feeding set. The emitter and detector are located in the yoke assembly, which connects to the microcontroller circuit board at Q7 and LED1. The drop detect circuit is calibrated by turning the pump on without a set installed. The calibration test point, TP32, is monitored and R3 is adjusted until +1.00VDC is present at TP32.

After calibration, the IR emitter is controlled by Q1 through the low pass filter circuit of U1A and associated parts. The unit will compensate for signal degradation or foreign material between the emitter and detector by increasing the emitter current.

C9,U1B, R55, R11, R13 and R58 form a differentiator/comparator circuit to transform the drop pulses into a logic level square wave. C9 blocks the DC component of the detector signal. R13 and R58 form a resistor divider that is used as a comparator level for U1B. Any incoming signal of greater magnitude is amplified and turned into a logic level pulse by U1B. The drop detect signal can be monitored at TP3.

Set Detection

The set detection circuit uses a magneto-resistive sensor, R2. The set sensor is located on the back of the main PCB. R20 functions as a pull up resistor. The set detect signal can be monitored at TP26.

Rotor Detection

The rotor detection circuit uses a low power Half-effect sensor, E3. The rotor sensor is mounted on the microcontroller circuit board and detects magnetic flux from magnets mounted in the rotor via a metal pin in the motor housing. R19 functions as a pull up resistor. The rotor detect signal can be monitored at TP35.

Motor Control

The motor control section is designed to turn on and off. The motor runs from the regulated +5VDC supply.

The microcontroller switches the motor on and off through Q8B. Q4 pulls the gate low to enable current flow to the motor. Q16 acts as a motor brake and fail safe, shorting the motor terminals when Q4 is off. The motor control signal can be monitored at TP23 and the motor voltage can be monitored at TP24.

Failsafe

The failsafe circuit is designed to prevent a continuous motor on condition. When power is applied to the motor, the voltage regulator, U7, begins to charge C29 through R81. If motor power is applied for approximately 13 seconds, the resistor divider network, R82 and R83, and the trigger circuit of Q17A and Q17B will fire Q18. When Q18 triggers, the microcontroller circuit board fuse, F2 is connected via a virtual short condition from power input to ground and blown. In normal operation, the motor runs for a period of approximately two seconds. When the motor is turned off C29 is discharged through D8, using the motor windings as a load. C25 prevents excessive inrush generated when switching.

Audio Alarm

The Vbatt. peak-to-peak voltage is generated by a combination of U8, U4 and Q3. U4 generates a voltage to bias Q3, which provides a ground for the buzzer circuitry. U8 generates a positive and negative peak-to-peak voltage, which is filtered by C5 and C27. D9 and D10 are used to clamp voltage spikes to the rail.

Language Selection

Pressing and holding the ON key down for three seconds accomplish language selection. This will initiate the bio-tech mode, and after four to five seconds the unit will display "SEt LAng". The arrow keys or rate knob is used to scroll through the list of available languages. The selected language is stored by an ON key press or 5 second time out. Pressing any other key will abort the biotech mode.

Cleaning is to be performed as required. The user will define the cleaning intervals based on their knowledge of the environment in which the pump is used. Cleaning may become necessary between intervals due to unforeseen soiling. Only personnel trained in the cleaning of medical devices shall perform cleaning.

Important User Information

CAUTION DO NOT IMMERSE PUMP OR POWER CORD IN WATER OR OTHER CLEANING SOLUTION; CLEAN USING A DAMP (NOT WET) CLOTH OR SPONGE. FAILURE TO FOLLOW THE CLEANING PROCEDURES DESCRIBED HEREIN COULD RESULT IN HAZARDS TO USERS. As with any A.C. powered electrical device, care must be taken to prevent liquid from entering pump or the power cord receptacle to avoid electrical shock hazard, fire hazard, or damage to electrical components.

Should any of the following events occur, DO NOT USE the pump until it has been properly cleaned and serviced by personnel trained in servicing KANGAROO* pumps:

- wetting of the pump's power cord or leakage into the pump interior during cleaning.
- spillage of large amounts of formula onto the pump exterior or any spillage on the power cord.

General Cleaning Directions

CAUTION Disconnect pump from A.C. power source before cleaning. Upon completion of cleaning, do not connect to A.C. power source until pump and power cord are thoroughly dry.

- A mild detergent should be used for general cleaning. If necessary, the pump may be cleaned with 10:1 water hypochlorite mixture, however, repeated cleaning with this solution can damage the plastic pump case. Isopropyl alcohol applied with a damp (not wet) cotton swab may be used for cleaning difficult-to-reach areas, such as the drop sensor and inside the A.C. receptacle, however, it should be used sparingly because repeat cleaning may damage the case.
- DO NOT USE strong cleaners such as Spray-Nine**, Phisohex†, Hibiclens††, or Vesta-Syde†* because damage to pump case housing can result.

Directions For Cleaning Pump Housing

- Refer to General Cleaning Directions before starting.
- Clean outside service with a damp (not wet) cloth or sponge and keep pump in upright position as much as possible.
- Avoid excess moisture near handle hinges.
- Avoid excess moisture near pole clamp area.

Directions For Cleaning Pump Power Cord

- Refer to General Cleaning Directions before starting.
- Unless soiling is observed, the power cord should not be cleaned.
- If cleaning of the power cord is necessary, wipe the exterior surfaces of the wall plug of the power cord with a cloth dampened with isopropyl alcohol. CAUTION: Avoid exposing power cord to excess moisture, as this can lead to an electrical shock hazard.

Directions For Cleaning Drop Detector

- Refer to General Cleaning Directions before starting.
- Clean the drop sensors in the upper drip chamber guide with a cotton swab dampened with isopropyl alcohol.
- Be sure sensor areas are clear.

Directions For Cleaning Rotor Assembly

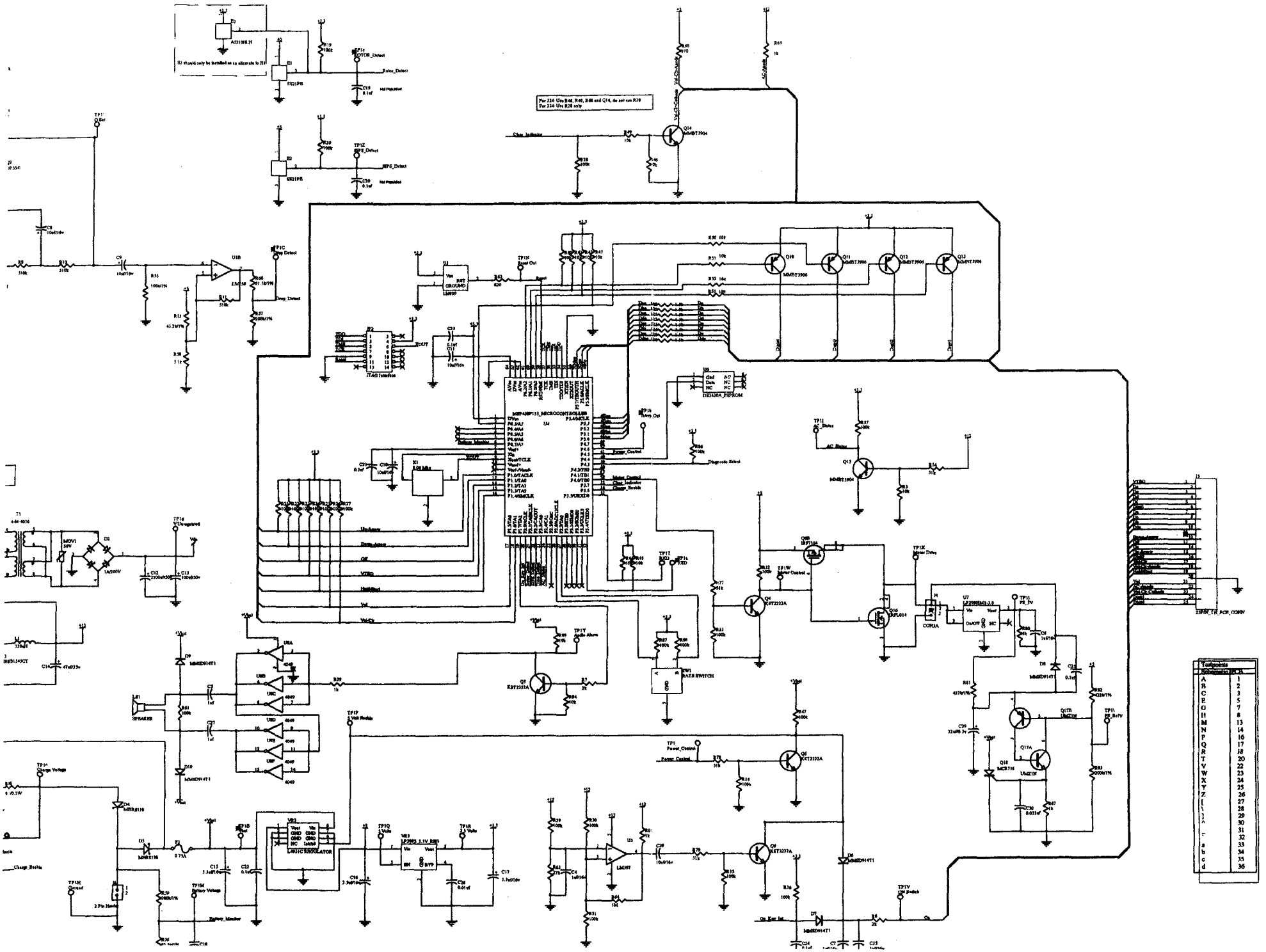
- Refer to General Cleaning Directions before starting.
- Loosen rotor set screw with 5/64" (2MM) allen wrench and gently pull rotor forward off shaft. After removing rotor, avoid getting any moisture in the rotor shaft opening.
- Clean rotors thoroughly with warm soapy water, or isopropyl alcohol if necessary.
- Be sure all parts of rotor are completely dry before putting it back onto shaft.
- To replace rotor, align set screw on hub of rotor with the flattened section of the output shaft.
- Push rotor into place and tighten set screw (Do not over tighten).

Preventative Maintenance

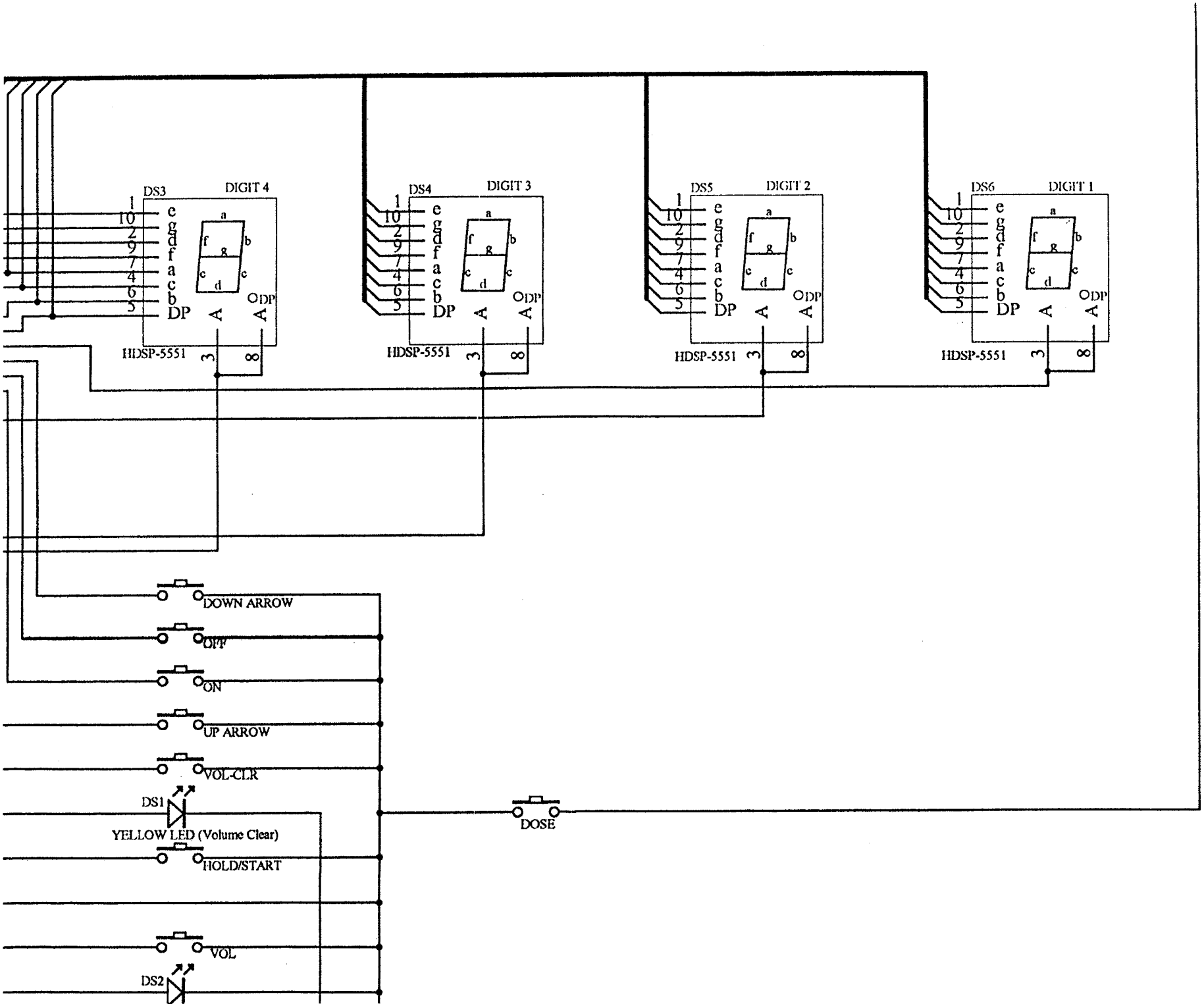
This pump must be periodically serviced to assure proper functioning and safety. The recommended service interval is 6 months, but in no case less than once each twelve (12) months per JCAHO. Servicing must be performed by personnel trained in servicing KANGAROO* pumps and may be done at the user's biomedical engineering department, an outside service, or by Tyco Healthcare Group LP Factory Service. To arrange for Tyco Healthcare Group LP Factory Service, call 1-800-448-0190.

The KANGAROO* pump contains no user serviceable parts. User maintenance consists of cleaning the exterior of the pump as stated in the cleaning section of this manual. All other maintenance is to be performed by the user's appropriately qualified technical personnel.

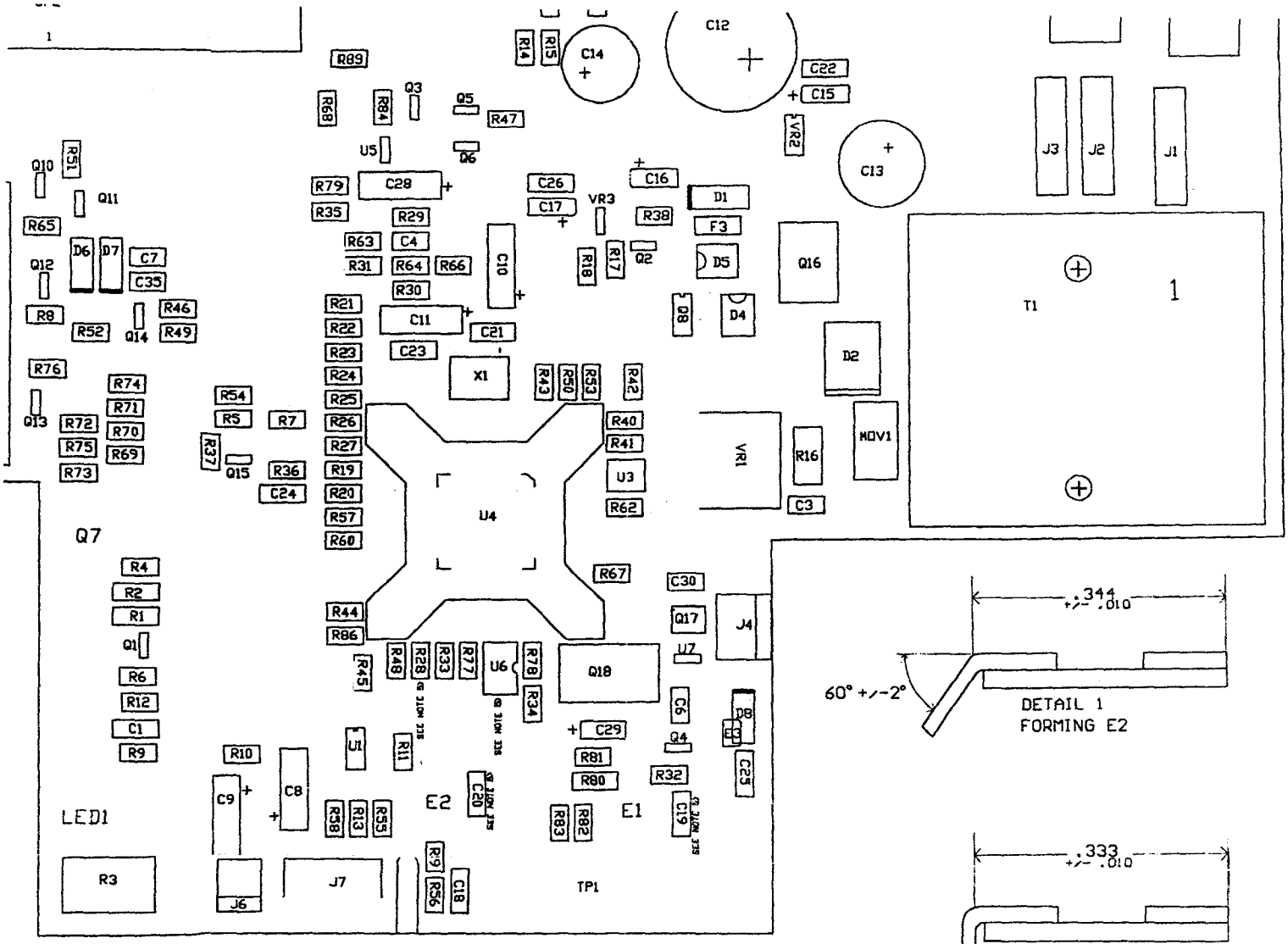
Schematic Diagram



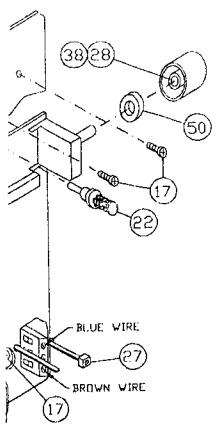
Assembly Diagram

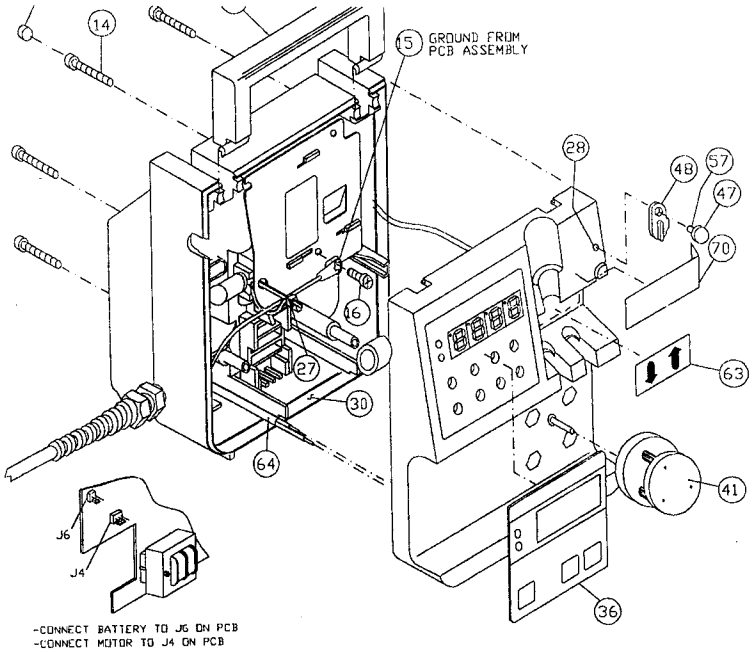

DS3
DIGIT 4
DS4
DIGIT 3
DS5
DIGIT 2
DS6
DIGIT 1
HDSP-5551
DOWN ARROW
OFF
ON
UP ARROW
VOL-CLR
DS1
YELLOW LED (Volume Clear)
HOLD/START
VOL
DS2
DOSE

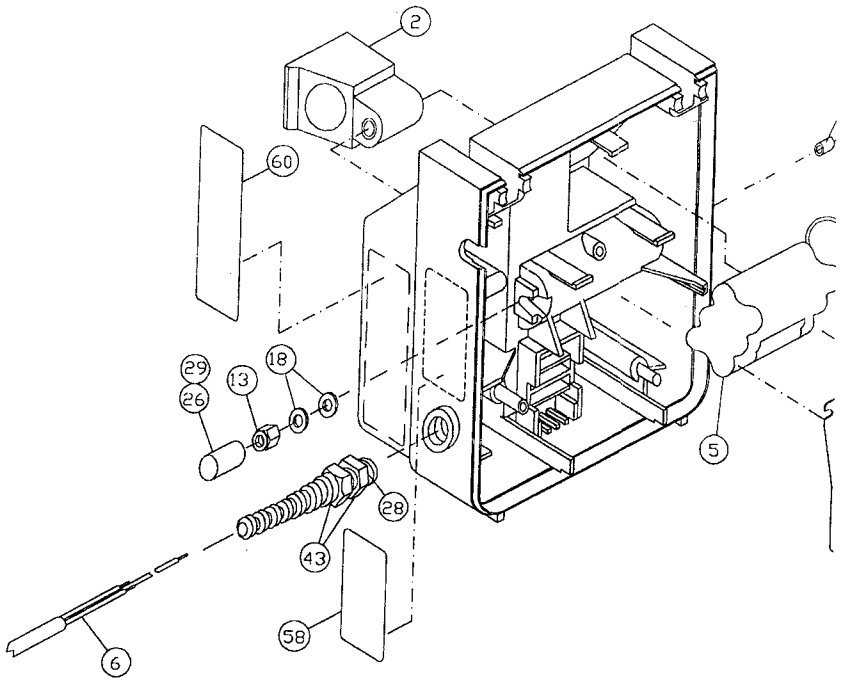
Assembly Diagram

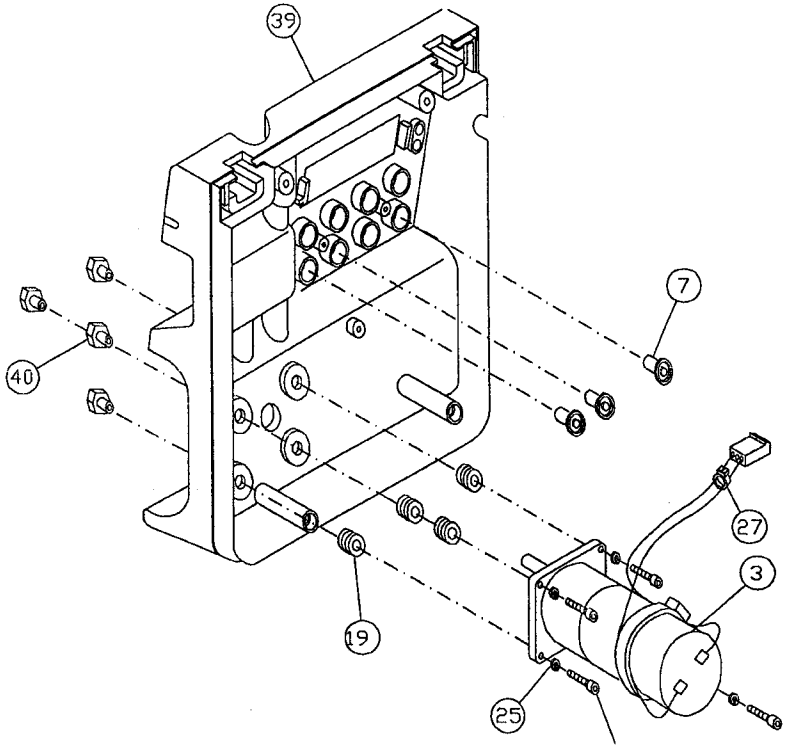

C12
C14
C22
C15
C13
VR2
J3
J2
J1
T1
1
R89
R14
R15
Q3
Q5
R47
R68
R84
U5
Q6
Q10
R51
Q11
R65
D6
D7
C7
C35
Q12
R8
R52
Q14
R46
R49
R79
C28
C26
C17
VR3
C16
D1
F3
R35
R29
R38
R63
C4
R31
R64
R66
R30
C10
R18
R17
Q2
D5
Q16
R21
R22
R23
R24
R25
R26
R27
R19
R20
R57
R60
C11
C21
C23
Q8
D4
D2
X1
R43
R50
R53
R42
R40
R41
U3
R62
U4
VR1
R16
C3
MOV1
R76
Q13
R74
R71
R70
R69
R72
R75
R73
R54
R5
R7
R37
Q15
R36
C24
Q7
R4
R2
R1
Q1
R6
R12
C1
R9
R67
C30
R44
R86
R48
R28
R33
R77
U6
R78
R34
Q18
Q17
U7
J4
R45
C6
D8
C29
Q4
C25
R81
R80
R32
R10
C9
C8
J5
R11
C20
E2
E1
C19
LED1
R58
R13
R55
R93
R82
R3
J6
J7
R9
R56
C18
TP1
.344
+/- .010
60° +/-2°
DETAIL 1
FORMING E2
.333
+/- .010
DETAIL 2
FORMING E1
DS2
DS1
DS3
DS4
DS5
DS6
BOTTOM SIDE
LS1

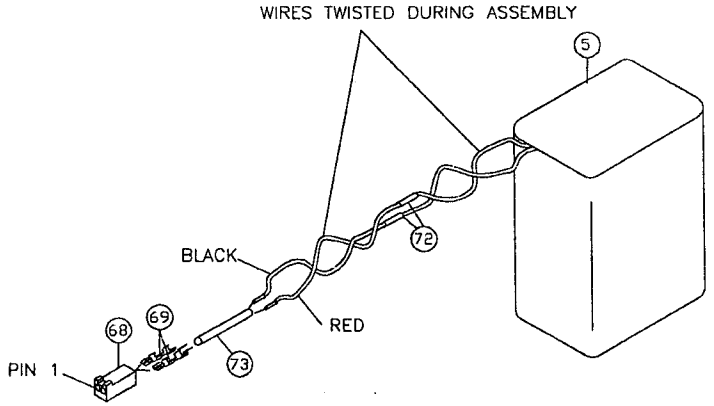
Parts Breakdown Diagram


38
28
50
17
22
BLUE WIRE
27
BROWN WIRE
17

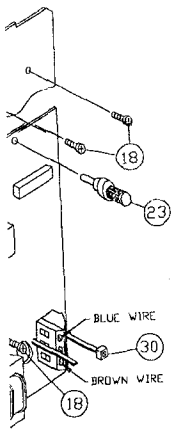

14
15
GROUND FROM PCB ASSEMBLY
28
48
57
47
70
16
27
30
63
64
41
J6
J4
36
-CONNECT BATTERY TO J6 ON PCB
-CONNECT MOTOR TO J4 ON PCB

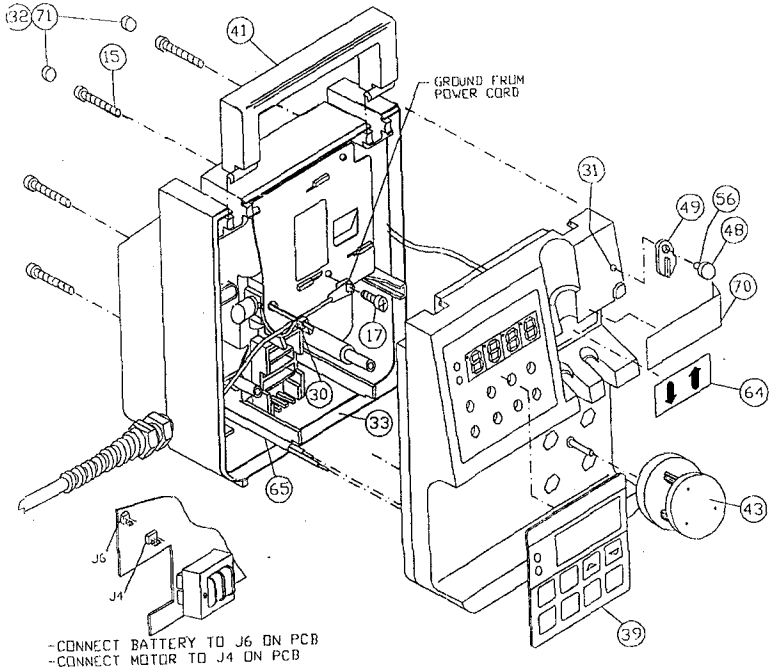

2
60
29
26
13
18
5
28
43
58
6

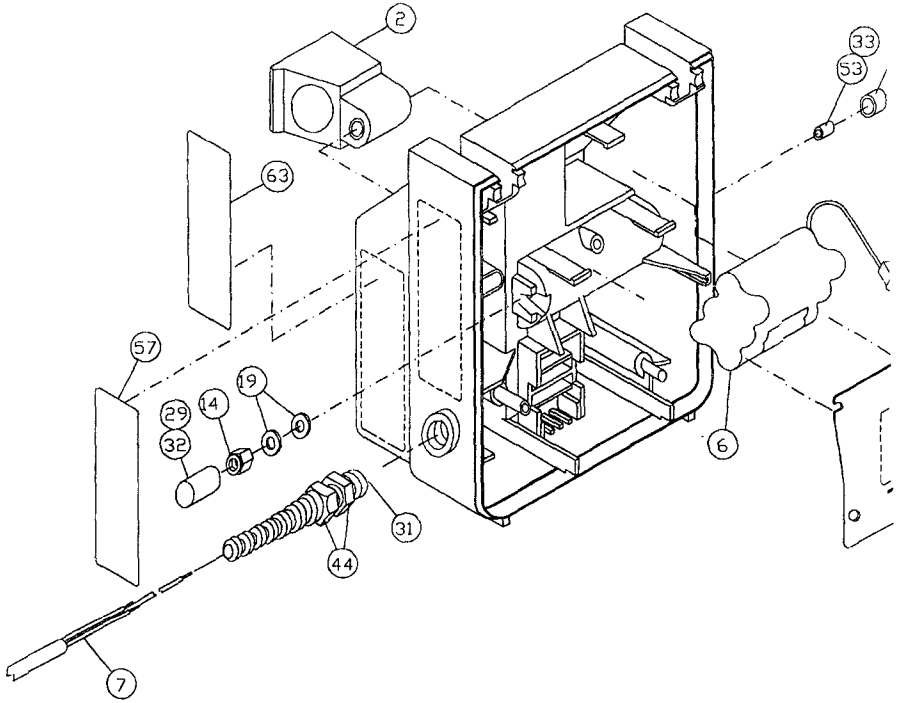

39
7
40
27
3
19
25

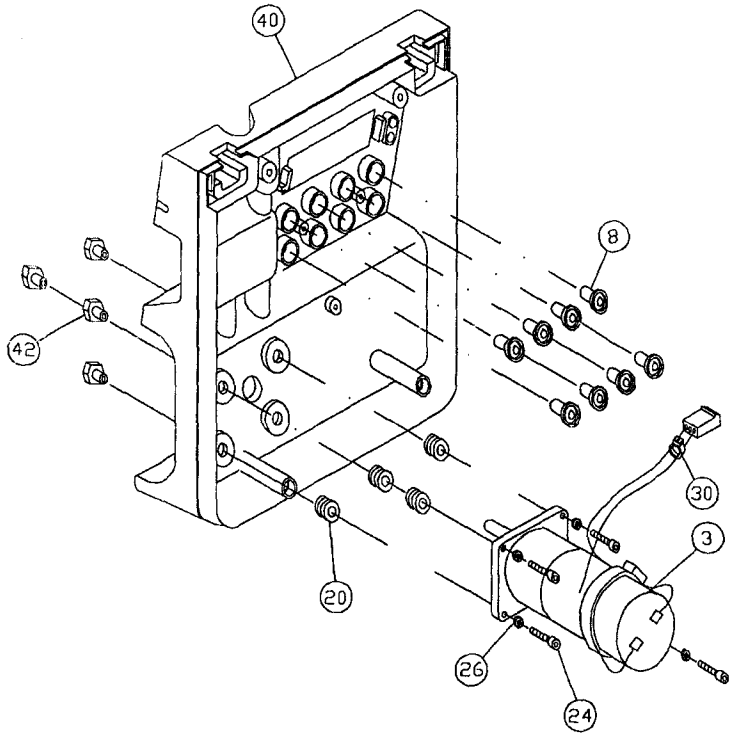

WIRES TWISTED DURING ASSEMBLY
5
72
BLACK
RED
68
69
73
PIN 1

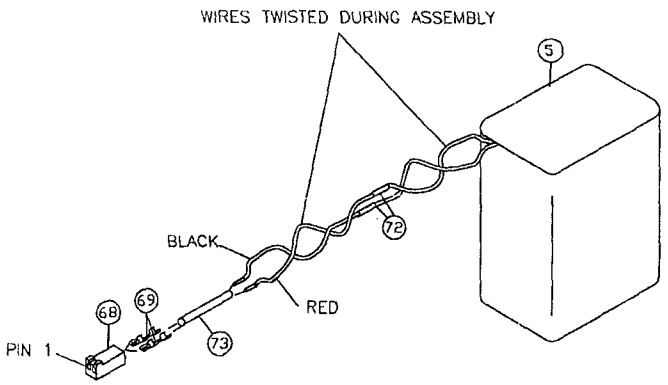
Parts Breakdown Diagram


BLUE WIRE
BROWN WIRE
18
23
30


GROUND FROM POWER CORD
-CONNECT BATTERY TO J6 ON PCB
-CONNECT MOTOR TO J4 ON PCB
J6
J4






WIRES TWISTED DURING ASSEMBLY
BLACK
RED
PIN 1

SECTION IX Troubleshooting Guide

Listed below are some of the probable causes of alarm conditions and their corrections.

SYMPTOM	PROBABLE CAUSE	CORRECTIONS
Flow Error Alarm *(FLO Err)*	Feeding container is empty.	Refill feeding container. If bag has been in use for 24 hours, replace.
	Feeding tube or feeding set tubing is occluded.	Locate point of occlusion and correct. Note: Occlusion may occur upstream or downstream from pump. • Feeding Container • Feeding Pump Set (control clamp closed) • Feeding Tube - patency of feeding tube should be checked.
	Drip chamber is improperly placed in pump.	Check to make sure drip chamber is properly "locked" in position in drip chamber guide.
	Drip chamber walls are coated with feeding formula.	Check to make sure formula is not feeding preventing detectors from proper operation. If formula cannot be removed from inside walls of chamber via chamber manipulation, replace set.
	Sensors in upper drip chamber guide are blocked.	Check to make sure detectors are free of dried formula. Remove any deposits by using a cotton swab dampened with warm soapy water or isopropyl alcohol.
Low Battery Alarm *(Lo bAt)*	Battery has been run down below point of maintaining accuracy of pump.	Plug pump power cord into wall outlet.
Hold Error Alarm *(HLd Err)*	Pump has been left in the hold mode for over 5 minutes.	Press START/HOLD to silence alarm, then press START/HOLD to restart pump.
Load Set *(LoAd SEt)*	Pump set has been improperly placed onto pump.	Check to make sure only Kangaroo Pump Set has been placed onto the pump. Check to make sure that retainer clip on pump set has been properly positioned into retainer lock on pump.
System Error Alarm *(SYS Err)*	Rotor is not turning while pump is running.	Return pump for technical service.
	Rotor is turning but is not detected by rotor sensors.	Return pump for technical service.
Volume to be Delivered *(Vtbd dEL)*	Preset volume has been delivered to patient.	Cancel the VTBD feature by pressing VTBD and until zero is displayed. To feed additional volume, increase the VTBD amount by pressing VTBD, then until new dose is displayed. Turn the pump off.
No Audible Alarm	Alarm volume set too low.	Turn up alarm volume.
	Battery is fully discharged.	Charge battery for a minimum of 15 hours.
	Alarm circuitry failure.	Return pump for technical service.

The KANGAROO* Feeding Pump is designed to minimize the effects of uncontrolled electromagnetic interference and other types of interference. When using the KANGAROO* Feeding Pump, avoid the use of equipment that causes erratic operation or degradation in performance.

Biotech Mode

To enter Biotech mode:

1. Turn pump off.
2. Press and hold the **ON** key for 6-7 seconds.
3. Pump alternately displays: **biotECH** for 5 seconds. Pump then displays **SEt LAng** for 5 seconds. To select the language press ▲ or ▼ buttons to cycle through the list. When the desired language is displayed, press the **ON** key to set.
4. Pump now displays: **bEEP LVL**. Select desired volume (1 to 10) using increment and decrement functions then press the **ON** key to set.
5. Pump returns to **HOLD** mode.

NOTE: Pressing the On key will set the value displayed and continue to the next item in the sequence. This will also happen automatically by waiting 5 seconds.
NOTE: Changes are saved permanently.

<47DA>

UL Listing

Medical Electrical Equipment KANGAROO* Enhanced 224/324 Feeding Pump

1. Classified with respect to electrical shock, fire, and mechanical hazards only in accordance with UL2601-1.
2. Classified with respect to electrical shock, fire, mechanical and other specified hazards only in accordance with CAN/CSA C22.2 NO. 601.1.

Type Infusion Device

Volumetric

Pumping Mechanism

Rotary Peristaltic

Pump Set Required

Tyco Healthcare Group LP KANGAROO*
Feeding Pump Administration Sets

Operating Range

K224 Rate: 5-300ml/hr in 5ml/hr increments
K324 Rate: 1-300ml/hr in 1ml/hr increments
K324 VTBD: 1-2000ml in 1ml increments
K324 Volume Delivered: 1-9999ml (rollover is accounted for)

Accuracy

±10% of selected flow rate over any 2 hour period.

Occlusion Pressure

12 psi (82.7 kPa) Nominal

Alarms

- Flow Error
- Hold Error
- System Error
- Low Battery
- Load Set
- VTBD Delivery (K324)

Memory of Settings When Pump is Off

16 hours for battery, 24 hours for AC

Battery

- Rechargeable Nimh
- Automatically charges when pump is plugged into wall outlet
  Recharge time for fully discharged battery is approximately 12 hours
- A new battery, when fully charged, will operate for approximately 16 to 18 hours at 125 ml/hr

Dimensions

Approximately 7¼" High x 5½" Wide x 4¼" Deep (18.4 cm High x 14.0 cm Wide x 10.8 cm Deep)

Weight

Approximately 3.625lbs. (1.7 kg)

Case Material

ABS Plastic–FIRE RESISTANT

Power Requirements

120V, 60Hz, 1Amp

If the integrity of the protective earth conductor arrangement is in doubt, operate unit from its internal electrical power source.

Ambient Operating Conditions

10° to 40°C (50° to 105°F)

Transport and Storage

(not to exceed 30 days)

0° to 50°C (32° to 122°F)

10-95% RH, non condensing

In the event that the environmental conditions for transport and storage are exceeded, return the unit for factory service.

In the event that the specified storage time limit exceeded, within the environmental limits specified, perform the performance tests prior to use. Refer to the KANGAROO* Enhanced 224/324 service manual for servicing information.

Type of Protection Against Electric Shock

Class 1

Degree of Protection Against Electric Shock

Type BF

Mode of Operation

Continuous

Degree of Protection Against Ingress Fluids

Drip proof - IPX1 Per IEC 529

Degree of Protection Against Flammable Anesthetic Mixtures

Not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.

Explanation of Symbols

	Connection point for protective earth ground
SN	Serial Number
	Attention, consult accompanying documents (Service Manual)
~	Alternating Current
	Type BF equipment (degree of protection against electrical shock)
IPX1	Drip Proof (degree of protection against ingress fluids)
	Store between these temperatures

SECTION XI Factory Service/Ordering Information

A. In the event that it is necessary to return a unit for repair, please observe the following:

1. Call customer service for Authorized Return Number and Shipping Instructions:

   In the U.S.: 1-800-448-0190 or (315) 788-524

   In Canada: 1-877-664-Tyco (8926)

2.. Pack the instrument carefully and ship to:

United States	Canada
Tyco Healthcare Group LP	Tyco/Healthcare Canada
98.6 Faichney Drive	7500 Trans Canada highway
Watertown, NY 13607	Pointe-Claire, Quebec H9R 5H8

B. To place an order for repair or if technical assistance is required , call customer service. Technical information will be made available upon request to allow the users appropriately qualified technical personnel to repair the parts of the equipment designated by the manufacturer as repairable. Refer to the KANGAROO* 324 Pump service manual for more service information.

The KANGAROO* 324 Enteral Feeding pump contains no user serviceable parts. User maintenance consists only of cleaning the exterior of the pump as stated in the cleaning section of this manual. All other maintenance is to be performed only by the user's appropriately qualified technical person.

SECTION XII Warranty

Tyco Healthcare Group LP (hereinafter referred to as T.H.G.L.P.) warrants that each KANGAROO* Enhanced 224/324 Feeding Pump will be free from defects in materials and workmanship under normal use and service for a period of sixty (60) days from the date of delivery by T.H.G.L.P. to the first purchaser. If any such defect occurs during the warranty period, the aforesaid purchaser should communicate directly with T.H.G.L.P. If returned to T.H.G.L.P., T.H.G.L.P. will arrange for repairs or replacement within the terms of the warranty. The defective pump should be promptly returned properly packaged, postage prepaid. Loss or damage in return shipment to T.H.G.L.P. shall be at Purchaser's risk.

This warranty shall not apply to, and T.H.G.L.P. shall not be responsible for, any loss arising in connection with the purchase or use of any such pump which has been repaired by anyone other than an authorized T.H.G.L.P. representative or altered in any way so as, in T.H.G.L.P.'s judgement, to affect its stability or reliability or which has been subject to misuse, negligence or accident, or which has been used otherwise than in accordance with the instructions furnished by T.H.G.L.P. T.H.G.L.P. neither assumes nor authorizes any representative or other person to assume for it any other liability in connection with the sale of such pumps.

T.H.G.L.P. DISCLAIMS ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE OF APPLICATION OTHER THAN THOSE EXPRESSLY SET FORTH IN THE APPROPRIATE PRODUCT LABELING OR USER INFORMATION MANUAL. IN NO EVENT WILL T.H.G.L.P. BE LIABLE FOR ANY INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH THE PURCHASE OR USE OF ITS PRODUCTS.

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